# California State University, Los Angeles Department of Biological Sciences BIOL 3000 – Biostatistics (hybrid course) Fall 2024

# **COURSE INFORMATION**

### **Instructor Information**

Instructor: Serj Danielian, Ph.D. Lecture Access: Online: check your class section below for location and times Lecture Zoom link: https://calstatela.zoom.us/j/83810052785 Office Hours Zoom link: https://calstatela.zoom.us/j/85783935243 Office location: KH B4006 (on Wednesdays only, the other times I meet online) Email: sdanie10@calstatela.edu Office Hours: Wed 12:25 - 1:25 pm via in-person and Zoom; Fri 9 - 10 am via Zoom: also, by appointment (contact the instructor with your available times) What are office hours? Silly question? Think about office hours as a quick breakout session with your instructor. There is nothing to prepare. Just bring yourself! This is a time for students to come talk to their professors about the course and/or any confusion or questions they may have. Really office hours are your time, for YOU!

Remember, you do not need to prep anything for office hours, just come as you are, ready to engage in a nice conversation about the course with me! Consider coming to office hours!

Prerequisites: Grade of C or higher in BIOL 1200; calculus ready

Class Days/Time/Location: (Lectures are Synchronous - Online; Labs are Asynchronous). See your specific section for a specific time.

Class code	Class #	Section		Days	Start time	End time	Location	Class mode	Instructor
92469	BIOL 3000	01	LEC	TuTh	8:00 AM	9:15 AM	ONLINE	synchronous	Dr. Danielian
92470	BIOL 3000	02	LAB	NA	no lab meeting	no lab meeting	ONLINE	asynchronous	Dr. Danielian
92475	BIOL 3000	05	LEC	TuTh	1:40 PM	2:55 PM	ONLINE	synchronous	Dr. Danielian
	BIOL 3000	06	LAB	NA	no lab meeting	no lab meeting	ONLINE	asynchronous	Dr. Ramirez

## **Course Description**

The purpose of this course is to apply Statistical analysis to biological problems, with emphasis on sampling, experimental design, chi-square analysis, t-test, one-factor, and two-factor analyses of variance, linear and logistic regression analyses, and correlation analysis. We will address these topics both in lecture and lab. During the lectures, we will explore how these specific processes work at their most basic level. During the lab, we will explore these same topics through coding practices using R. R software primarily uses the same basic computational steps that we learn during the lecture. Both lecture and lab are complementary to each other.

This is an online-hybrid course meaning that the Lectures are Online (synchronous), while the labs are entirely online (asynchronous). We will have a scheduled time for lectures but no planned time for labs. The lectures will follow a more traditional format of lecturing, while the labs will not. All lab content will be posted ahead of time, and you will have several days to complete the labs. Many of the labs have videos embedded in them to explain how each specific lab assignment works. All the lab assignments are due on Fridays at the end of the day. You can contact me through email (please follow the *emailing format*, see syllabus). You can also attend my office hours and complete the lab in the background. There are usually other people attending my office hours who might have similar questions, so you are welcome to complete the labs during my office hours and have a community of people working on the same assignment. You will also benefit from having me in the background to help you with any questions you might have.

### **Course Learning Outcomes**

By the end of this course, students should be able to:

- 1. recognize various types of data
- 2. summarize data effectively using plots and descriptive statistics
- 3. choose the correct statistical analyses for a variety of experimental situations
- 4. R software to carry out statistical analyses
- 5. interpret correctly the results of statistical analyses produced by software and that appear in scientific literature.

## **REQUIRED COURSE MATERIALS**

#### Textbook - free download available

OpenIntro Statistics, 4<sup>th</sup> edition by Diez, Barr, and Çetinkaya-Rundel; ISBN: 9781943450077. This open-source textbook is available at no cost as a PDF here: <u>https://www.openintro.org/book/os/</u>. Printed copies may be rented or purchased at low cost from the campus bookstore or from Amazon.

#### **Other Readings**

Outline of Lecture material will be posted on Canvas.

#### **Other equipment / material requirements**

Materials: Scientific calculator

*Software Requirements* (Word, R, RStudio): You are expected to have these 3 software installed on your personal computer. See *General Course Information* section on Canvas on how to download these software. Word is free of charge to continuing CSULA students, while R & RStudio are free for everyone to download.

## **COURSE/ATTENDANCE POLICIES**

You are expected to attend all lectures. Lectures will also be recorded and posted on Canvas. A written medical excuse is required to miss an exam. There are no physical meetings required for the labs. All lab assignments must be submitted online.

#### **Course Structure**

This course is to be conducted in hybrid format. Lecture content is Online - Synchronous (meet over Zoom at a specific time & day), while the Labs are online - Asynchronous (no specific time or day and no meetings required for the lab). You will participate in the course using Cal State LA learning management system, <u>CANVAS</u>.

#### Attendance

Regular attendance is strongly encouraged, but not mandated. I will do my best to record the lectures and post those online for your later viewing. You must attend class on day 1 to assure you are not dropped from class automatically.

#### Computer Requirements (must have regular access to a Computer)

You will need to have weekly access to a Windows or a Mac machine. Unfortunately, tablets and Chromebooks are not compatible with some of the software we will be using in this class. If you do not currently have access to a computer and you are enrolled in this course, there are options for helping you get access to a computer for the semester. As stated on the CSULA website, the Dean of Students has a limited number of laptops available for check out. Please call (323) 343-3103 to schedule an appointment or send an email to the following address deanofstudents@calstatela.edu .

*Chromebook* users may use instructions <u>here</u> to download R and RStudio on their Chromebooks. Please keep in mind that if you run into any issues with R and RStudio on a Chromebook, I will not be able to help since R and Rstudio are not officially supported on a Chromebook.

You will need to have an up-to-date browser and operating system on your computer to take this class. Check the <u>ITS</u> <u>Helpdesk Student Resources page</u>. Some of the documents in this course will be available to you in PDF form. You will need to download and install <u>Adobe Acrobat Reader software</u> on your computer.

#### **Assignments and Grading Policy**

- *Exam:* There are four exams (including the Final Exam) in this class. See class schedule for pending exam dates. These dates are subject to change. **Make-up exams will NOT be allowed without prior permission of the instructor.** Exams are worth 100 points each. The Final Exam is not cumulative. Exams will include multiple-choice and free-solution parts. You do not need to submit your work for the multiple-choice part, however, you will be asked to submit your solutions for the free-solution part. *Timing*: exam will usually open at 7 am on the day of the exam and close at the end of the day. Within this time frame, you will have 150 minutes to complete your exam.
- *Homework:* There will be a total of eight homework (HW) assignments, and each is worth 20 points. Each homework assignment has 10-20 multiple choice questions, and each question is worth 1-2 points. These assignments will be graded automatically on Canvas, and the lowest HW score will be dropped. Assignments must be done individually. After solving the HW problems by hand, you must enter the answers in a multiple-choice format on Canvas. Late homework assignments will not be accepted, no exceptions. Due dates are announced during the lecture and posted on *Canvas. Timing*: Homeworks will be posted multiple days prior to the deadline.
- Laboratory: The laboratory portion of this course will be held online (asynchronous). Each laboratory assignment will have a computer-based assignment (10 points each). Each question is worth 1-4 points, and is graded manually by the instructor. Feedback will be provided for every deducted point. All assignments must be completed and uploaded to the instructor using *Canvas* before the due date. Late lab assignments will not be accepted without the prior permission of the instructor. The lowest Lab assignment grade will be dropped. *Timing*: Labs will be posted multiple days prior to the deadline. *Note\* I highly recommend taking your time to complete these lab assignments in R. Knowing how to properly use this tool (i.e. R) will benefit you in the future. You can directly include the knowledge of R and RStudio on your resume and this will increase your chances of getting a job. This will also be useful in graduate school and med school applications as most researchers in biological sciences use R and RStudio. There is simply No escape from R and RStudio if you intend to work in biology-related fields. So, please learn to use R and RStudio by understanding every line of code you write. Attend office hours for help or email me if you have any questions.*
- *Review Quizzes* These are low-stakes quizzes designed to refresh your knowledge of course material before every lecture. You will have the chance to drop multiple low scores on this specific assignment. Students in my past classes have reported that the act of reviewing before every class has enhanced their understanding of the course material and has earned them a better grade! These quizzes will be due before most lectures (no review quizzes on or after exam days). *Timing*: These quizzes will be posted 1 day before the deadline and be due 8 am on the day of the next lecture. Remember, these are designed to help you review the previous lecture's material before moving to a new topic!
- *Extra Credit* There are multiple opportunities to earn extra points in this class. The details and the due date will be announced in class. There will be some impromptu extra credit assignments announced in class, and will only be available to those in attendance.

Exceptions to Late assignment policy: If you have a documented reason clearly stating that you were unable to complete an assignment during the entire time it was posted online, please contact me with proof (i.e. doctor's note). However, if the assignment was posted 5 days prior to the deadline, and you only have a doctor's note for the last day, you will (likely) NOT be excused from the assignment.

Points Possible	Assignment		Р	oints		
	Exams (4)			400		
	HomeWorks (8, dr	op the	140			
	Lab Assignments (	(12, dr	110 100			
	Lecture Review Qu	uizzes				
Extra Credit					tba	
	Total:				750	
<b>Grading Scale</b>	A		$\geq 92\%$	A–	88.00% - 91.99%	
<i>B</i> + <i>84.00%</i> - <i>87.</i>	99% B	•	80.00% - 83.99%	<i>B</i> –	76.00% - 79.99%	
<i>C</i> + 72.00%-75.9	0% C	<b>,</b>	67.00% - 71.99%	С-	63.00% - 66.99%	
<i>D</i> + 59.00% - 62.	99% D	)	55.00% - 58.99%	<i>D</i> –	51.00% - 54.99%	
	F	,	< 50.99%			

## **GRADING CRITERIA**

#### Grades

You can view your grades using the GRADES button in the course navigation links. Please check your grades regularly to make certain that I have received all your assignments. **I do not round or curve the grades.** If you have a question about a grade, email me at <u>sdanie10@calstatela.edu</u>. Please do not post your personal information in a discussion forum.

## **COURSE COMMUNICATION**

#### Interaction with Instructor

Questions can be sent to the Instructor via email <u>sdanie10@calstatela.edu</u>.

As a student, you should expect to receive assignment feedback and responses to postings within 48 hours of the due dates. The Instructor will post an announcement alerting the students if he will be unavailable for more than a day.

#### Questions

In online/hybrid courses it is normal to have many questions about things that relate to the course, such as clarification about assignments, course materials, or assessments. Please email me your questions at <u>sdanie10@calstatela.edu</u> and please follow the <u>emailing format</u> (see below) when contacting me about Lab assignments.

#### **Turnaround/Feedback**

I check *emails* multiple times during the week (M-F). If you have questions or concerns and send me an email message, you can expect a response within two business days. Most of your submitted assignments will be graded within 48 hours of the deadline. In some cases, it may take up to a week for me to grade your assignments.

#### Interacting with classmates

When interacting with classmates, please follow the rules of netiquette: use Appropriate language and tone; follow general rules for grammar, punctuation, text fonts, and colors (no cartoonish fonts); show respect and consideration for other students; refrain from using sarcasm, humor, and/or the posting of jokes; and be mindful of Issues of privacy and information sharing outside of class.

#### **Emailing format\***

You should include the following information when contacting the instructor about any of the lab or homework assignments:

- 1. Your name, Section number.
- 2. The problem you are working on. Include page number, problem number.
- 3. Include the **line of code** you have used. (do not include multiple versions of the same code, no pictures of code)
- 4. Include the Error message you have received.
- 5. If you have multiple questions, **repeat** steps 2-4 for every question.

## **Helpful Student Resources**

#### COVID19 Student Resources Link:

#### **Technical Support Resources**

IT Infrastructure Services provides telecommunications services to the Cal State LA community. Use the links below to navigate to the appropriate support page. Information on Cal State LA technical support resources for students: <u>Technical Support</u>. You may also email the ITS help desk at <u>helpdesk@calstatela.edu</u> or call them directly at 323-343-6170. Here is another <u>link</u> to the ITS Frequently Asked Questions.

#### **Student Support Services**

Information on Cal State LA student support resources for students: <u>Student Services</u>. Here is some useful information about:

- <u>Financial Aid office</u>: assistance for current and prospective students from federal, state, and institutional sources.
- <u>Academic Records Office</u>: can assist with transcripts, certification of enrollment, processing leave of absences, and grade discrepancies. This office also assists with processing class registrations including: adds/drops, late adds, withdrawals, and registration to audit a course.
- <u>Student Health Services</u>: provides affordable health care for Cal State L.A. students.
- <u>Cal State LA Food and Housing Security Initiatives</u>: if you are struggling to get sufficient healthy food to eat, there is a food pantry on campus and many students are eligible for CalFresh benefits that can give you up to \$192 a month for groceries.
- <u>Counseling and Psychological Services (CAPS)</u>: while I want this class to challenge you, I recognize that excessive stress can be detrimental to your mental health. CAPS provides professional and non-judgmental mental health services to assist with students' personal growth and psychological wellness.
- <u>Career Development Center</u>: assists students in identifying on- and off-campus jobs, internships, and professional career placements.
- <u>Center for Student Involvement</u>: serves as a hub for involvement, recreation, and leadership.
- <u>University Testing Center</u>: administers exams for class placement and graduation competency.
- <u>Early Start Program</u>: aimed to better prepare students in written communication and mathematics/quantitative reasoning before the fall term of their first year of college, improving students' chances of completing a baccalaureate degree
- <u>Tutoring Center</u>: access tutoring services.
- Non-native language services: You may use 3rd party services such as Google Translate to get help with translation services.
- <u>Transfer student resources</u>: helps you get off to a great start in your first semester.

#### Academic Support Services

Information on Cal State LA academic support resources for students: Academic Support

#### **Canvas Student Support**

Information for students on how to be a successful online student and how to use Canvas: <u>Canvas Community Guides for</u> <u>Students</u> | <u>Canvas Student Tour Course</u>. You can also watch a simple <u>Canvas overview video</u> for first-time users.

#### **Library Services**

In this paragraph, you will find useful library links that support student learning and research. Here is a <u>link</u> to the university library's main page. You may use that link to access to library services such as Upcoming Library Events, Features Digital Collection, and Library building hours. You can also access <u>your library account</u>, <u>writing and citing</u> resources, <u>offline library use (vpn) access</u>, <u>book voucher program</u>, <u>Textbook rental program and compare textbook prices</u> <u>online</u>. At <u>this link</u>, you can contact a librarian, get a zoom appointment, and do an online chat with the library services. Through the library services, you may find information on <u>how to write research papers</u>, <u>find articles</u>, <u>use databases</u> (library FAQs page), and write <u>bibliographies</u>.

#### **First-Gen Professionals Career Launch**

The First-Gen Professionals Career Launch Program provides career networking strategies for first-generation college students (students who will be the first in their families to earn a bachelor's degree). Complete the Career Launch Challenge to receive a recognition medal to wear at graduation and enter into the raffle for a professional starter kit. Career Launch events: <u>First-Gen Professionals Career Launch | Cal State LA</u>.

#### **Career Exploration Network**

The Career Exploration Network supports major and career exploration. Join us for pizza and fun career conversations with professionals from various career pathways. Career Exploration events: <u>Career Exploration Network | Cal State LA</u>.

#### **Career Fair Success Program**

The job search is changing and so are career fairs, especially for college students. The Career Fair Success program will help you captivate employers at the **Cal State LA Career Fair on March 21, 10 a.m. to 2 p.m.** Career Fair Success events: <u>Career Fair Success Program | Cal State LA</u>.

#### **Career Center Photo Booth**

We provide free professional headshots with our self-service photo booth. Cal State LA students, faculty and staff can take professional photos to use on platforms like LinkedIn. Walk in anytime during our office hours to get your photo taken. About the Photo Booth: <u>Photo Booth | Cal State LA</u>.

#### **Career Clothing Closet**

We provide new and gently used interview and career-appropriate clothing free to currently enrolled students experiencing financial hardship. Student application: <u>Career Clothing Closet | Cal State LA</u>. **Do you have career clothing to donate?** We accept donations at our front desk during business hours. For assistance, contact us at careers@calstatela.edu or call 323.343.3237.

#### Internships

We posted over 31,000 internships and fellowships last year, and 96% were paid. Connect students with internships: Internships | Cal State LA. Do you have internships for academic credit? Establish an academic partnership: Internships for Credit | Cal State LA.

#### Student Jobs on Campus

We hired 1,450 student workers last year. Connect students with jobs on campus: <u>Find a Job On Campus | Cal State LA</u>. **Do you need student workers in your department?** Hire a student assistant: <u>Hire a Student Assistant | Cal State LA</u>.

#### **Request a Presentation**

We welcome collaborations and are available to present. Request a presentation: <u>Career Center Presentation</u>. **Are you teaching career development skills?** Use our instructional materials: <u>Faculty Resources | Cal State LA</u>.

## **COURSE & UNIVERSITY POLICIES**

#### **Student Handbook**

Information on student rights and responsibilities, academic honesty, standards of conduct, etc., can be found in Schedule of Classes for the current quarter visit the Cal State LA <u>Schedule of Classes Information</u> under Policies and Procedures.

#### **Dropping and Adding**

Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. Students should be aware of the current deadlines and penalties for adding and dropping classes by visiting the <u>GET home page</u>. (Registrar news and information)

#### Americans with Disabilities Act (ADA)

Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation. For more information visit the <u>Office for Students with Disabilities</u> home page.

#### Cal State LA accessibility policy

The <u>Office for Equity</u>, <u>Diversity and Inclusion (OEDI)</u> (323) 343-3040 coordinates the California State University, Los Angeles compliance with the ADA. The campus does not discriminate against students with disabilities in recruitment, admission, or treatment after admission. In addition, the campus must make reasonable accommodations to permit students with disabilities to fulfill academic requirements. The campus also must provide auxiliary aids to ensure that students are not excluded from programs because of their disabilities. If a disability precludes any student from receiving assistance the student may contact the Office for Student with Disabilities (OSD).

#### Students with Disabilities (OSD)

Students may contact the <u>OSD office</u> to obtain help (such as extended exam time, or a quiet exam room) with disability-related services. You may also contact OSD through email at <u>OSD@calstatela.edu</u> or call them directly at (323) 343-3140.

#### Academic Honesty/Student Conduct

Academic Honesty: Many incidents of plagiarism result from students' lack of understanding about what constitutes plagiarism. However, you are expected to familiarize yourself with Cal State L.A.'s policy on plagiarism. <u>All work you submit must be your own scholarly and creative efforts</u>. Cal State L.A. plagiarism as follows: "At Cal State L. A., plagiarism is defined as the act of using ideas, words, or work of another person or persons as if they were one's own, without giving proper credit to the original sources."

Here is the link to Cal State LA Policies and Procedures on Academic Honesty definitions.

**Student Conduct**: <u>Appendix E - Student Conduct / Student Conduct Procedures</u> will be used as a reference to address student code of conduct in Cal State LA.

#### **Classroom Conduct**

To create and preserve a classroom atmosphere that optimizes teaching and learning, all students share the responsibility of creating a positive learning environment. Students are expected to conduct themselves in a manner that does not disrupt teaching or learning, and they are expected to follow these standards:

- You are expected to be on time. I intend to begin class promptly at the designated time, and you should be ready to begin class at this time. Class ends at the designated time. Please refrain from packing up your belongings early. It is disruptive to me and to others around you.
- You must attend class prepared to fully participate. Questions and comments must be relevant to the topic at hand.
- Classroom discussion should be civilized and respectful to everyone and relevant to the topic we are discussing. Classroom discussion is meant to allow us to hear a variety of viewpoints. This can only happen if we respect each other and our differences.
- Any discussion from class that continues online should adhere to these same rules and expectations.
- Cell phones must be turned off or put on vibrate during class.

# Lecture & Laboratory Schedule (\* subject to change)

Week	Lecture Dates	Lecture Topic * review quizzes due before the start of next class	Book Chapters	Lab number & Topic	Lab Due, 5 pm	HW number	HW Due, 11:59 pm
01	8/20 , 8/22	Types of data; descriptive statistics, visualization # of review quizzes: 1	Ch. 1.1-1.2; Ch. 1.3-1.4, Ch. 2.1-2.3	Lab #1: Intro to R	8/23		
02	8/27 , 8/29	Types of data; descriptive statistics, visualization # of review quizzes: 2		Lab #2: Descriptive Statistics	8/30	1	8/31
03	9/3 , 9/5	Probability and probability distributions # of review quizzes: 2	Ch. 3.1-3.5; Ch. 4.1, 4.3, 4.5	Lab #3: Working with Data	9/6		
04	9/10 , 9/12	Probability and probability distributions # of review quizzes: 2		Lab #4: Probability Distributions	9/13	2	9/14
05	9/17 , 9/19	Exam #1; Central limit theorem; confidence intervals # of review quizzes: 0					
06	9/24 , 9/26	Central limit theorem; CI; Hypothesis testing # of review quizzes: 2	Ch. 5.1-5.2	Lab #5: Bootstrapping Categorical Data	9/27		
07	10/1 , 10/3	Hypothesis testing; Chi-square tests # of review quizzes: 2	Ch. 5.3, Ch. 6.1			3	10/5
08	10/8 , 10/10	Chi-square tests; contingency tables # of review quizzes: 2	Ch. 6.2-6.4	Lab #6: Contingency Tables	10/11	4	10/12
09	10/15 , 10/17	Contingency tables; Exam #2 # of review quizzes: 1					
10	10/22 , 10/24	Student's t-tests # of review quizzes: 1	Ch. 7.1-7.3	Lab #7: t-tests	10/25		
11	10/29 , 10/31	Student's t-tests; One factor analysis of variance (ANOVA) # of review quizzes: 2		Lab #8: One-factor ANOVA	11/1	5	11/2
12	11/5 , 11/7	One & Two factor analysis of variance (ANOVA) # of review quizzes: 2	Ch. 7.5; Canvas Reading	Lab #9: Two-factor ANOVA	11/8	6	11/9
13	11/12 , 11/14	Exam #3; Regression and Correlation # of review quizzes: 0		Lab #10 – Linear Regression	11/15		
14	11/19 , 11/21	Regression and correlation; Multiple linear regression # of review quizzes: 2	Ch. 8.1-8.4; Ch. 8.1	Lab #11 – Multiple Linear Regression	11/22	7	11/23
NA	11/26 , 11/28	Happy thanksgiving! - no class					
15	12/3 , 12/5	Logistic regression # of review quizzes: 2	Ch. 9.1-9.5	Lab #12 – Logistic Regression	12/6	8	12/7
16	12/10 , 12/12	Finals week					